Spera
le ragioni della ricerca

VITAres

Le Biotecnologie nello sviluppo di vaccini anti-Covid-19

Luigi Aurisicchio, PhD
Chief Executive and Scientific Officer
Rome, Italy

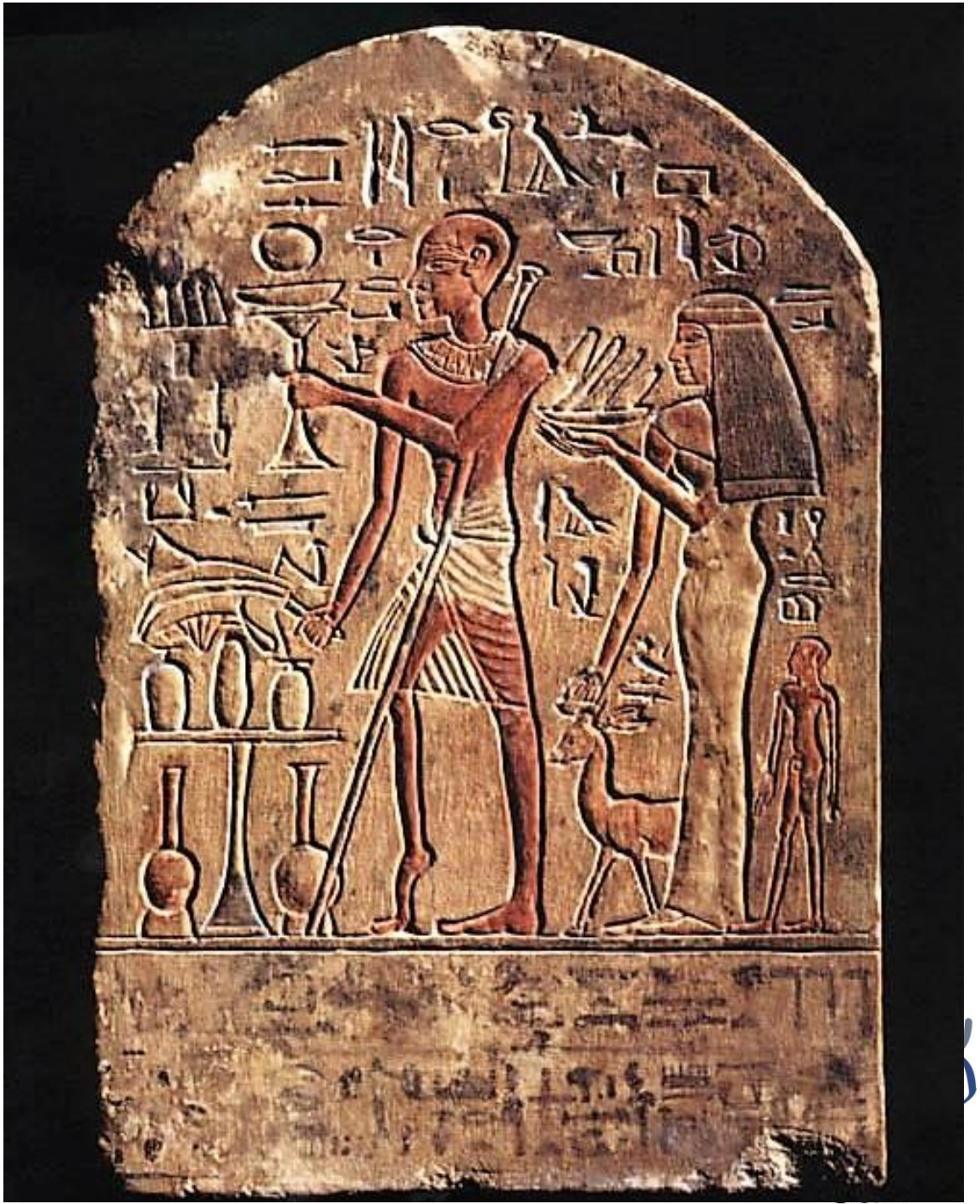
EnVixal
a Takis Company

Malattie Virali e Zoonosi ci sono sempre state nella Storia dell'Uomo e sempre ci saranno

a IRIS Company

Stele egiziana

3000 AC



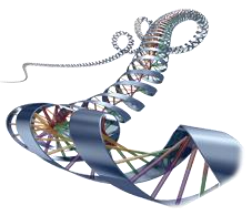
Il Virus della Poliomelite

Le malattie infettive hanno almeno due cause

<u>Necessarie</u>

ma non singolarmente <u>Sufficienti :</u>

- **Esposizione all'agente eziologico**
- **Stato di suscettibilità dell'ospite**

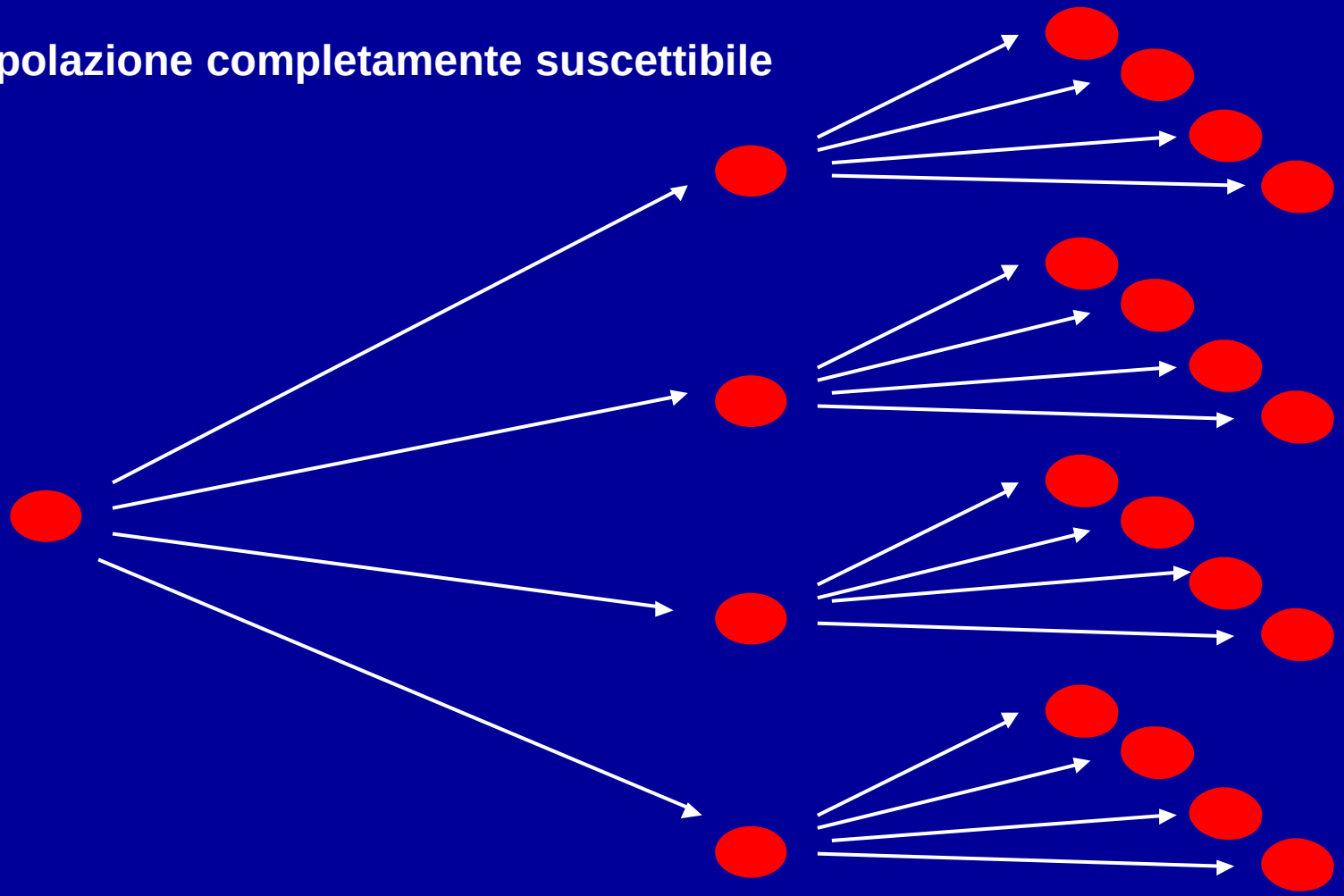


Suscettibili e Immuni

- Suscettibili: persone che non sono mai venute in contatto con l'agente (non hanno avuto la malattia, non sono stati vaccinati) per cui si possono contagiare
- Immuni: persone il cui sistema immunitario è stato già "allertato" contro uno specifico agente per cui un ulteriore contatto non causa malattia

Schema di Trasmissione Interumana

Popolazione completamente suscettibile

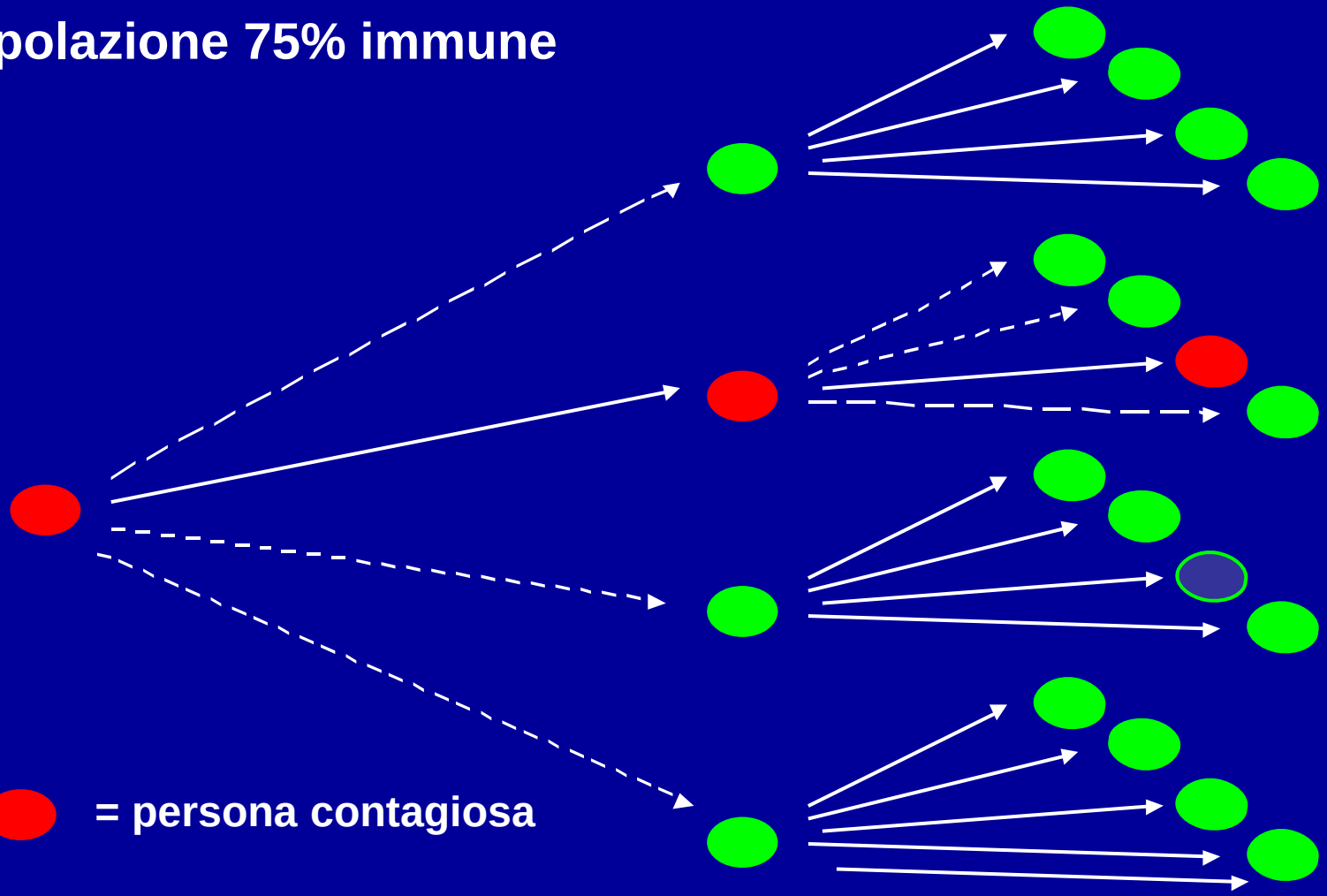


= persona suscettibile contagioso

= persona immune

Schema di Trasmissione Interumana

Popolazione 75% immune



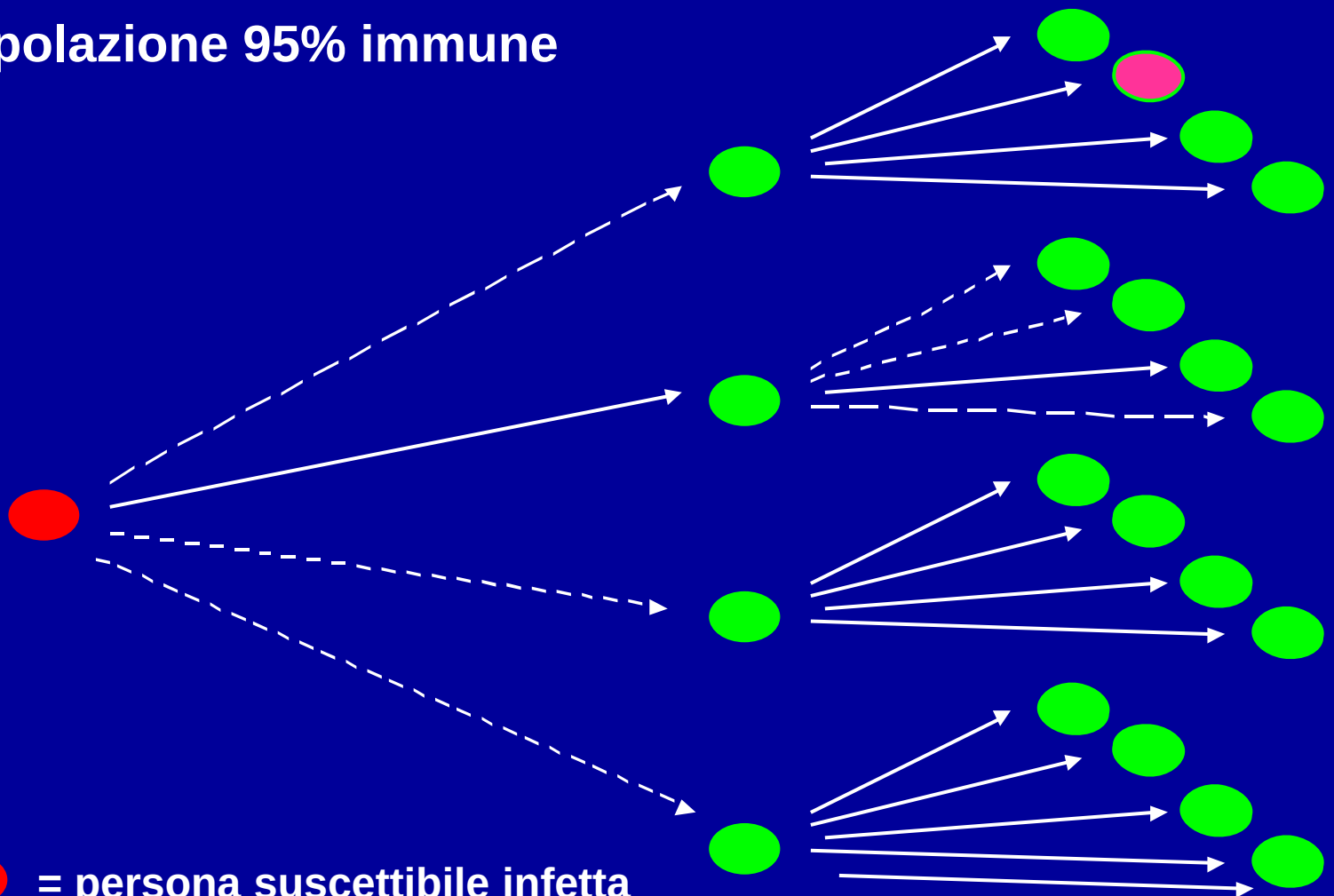
= persona contagiosa

= persona suscettibile

= persona immune

Schema di Trasmissione Interumana

Popolazione 95% immune



= persona suscettibile infetta

= persona suscettibile

= persona immune

Proporzione di immuni necessaria a ridurre la circolazione di infezioni

Morbillo	95%
Poliomielite	80-86%
Parotite	75-86%
Difterite	85%
Rosolia	83-85%
Vaiolo	80-85%
Hib	70%

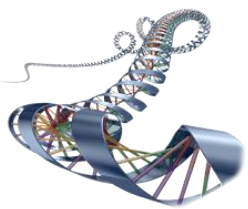
Malattie prevenibili

Tetano	• Circa 400.000 decessi di cui la metà sono neonati
Pertosse	• Circa 20 milioni di casi e 350.000 decessi
Hib	• Circa 500.000 morti di cui la maggior parte sotto i 5 anni di età
Meningococco	• Più di un milione di decessi
Pneumococco	• Circa un milione di decessi di cui la metà nel primo anno di vita

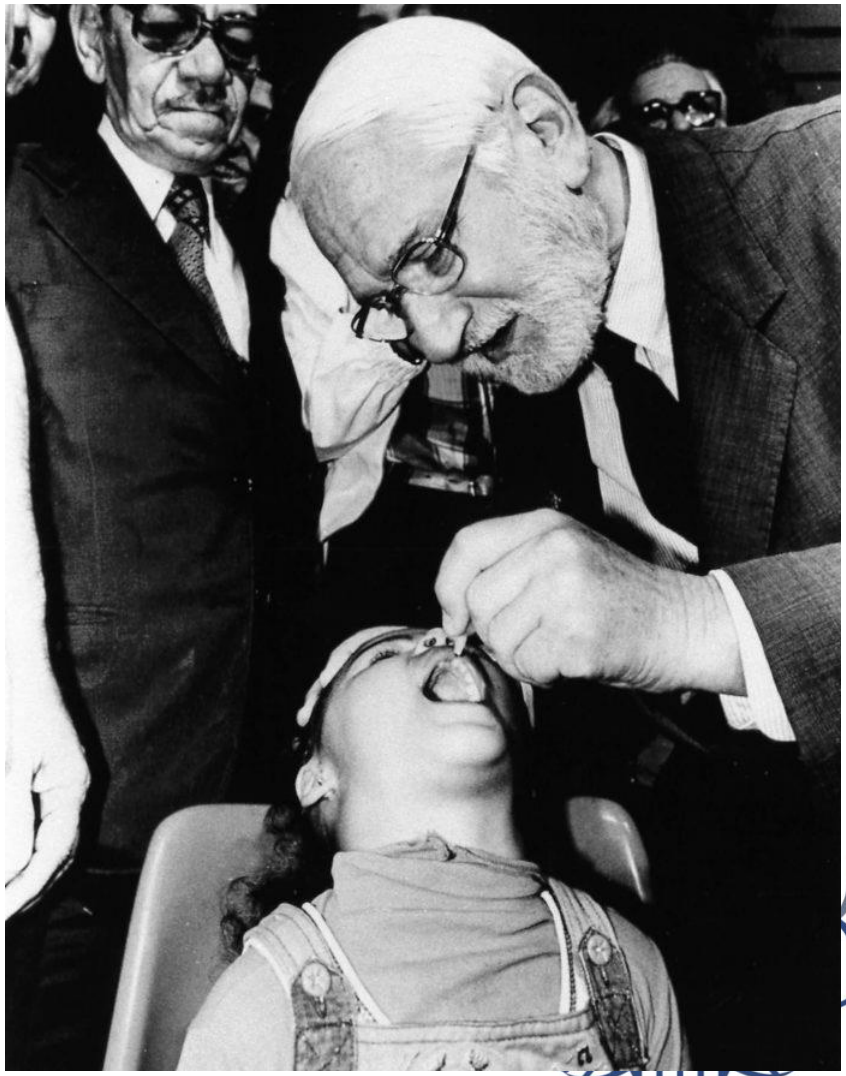
a Idis Company

Polio e Morbillo

- ✓ Virus geneticamente stabili
- ✓ Trasmissione esclusivamente interumana
- ✓ Non esistono serbatoi ambientali o animali
- ✓ Immunità permanente
- ✓ Non esiste lo stato di portatore cronico
- ✓ Quadro clinico specifico



I Vaccini anti-Polio



Poliomielite: 1939-2000

L’obiettivo e l’impegno formale contro la polio

Nel **1988**, la quarantunesima Assemblea mondiale della sanità approvò una risoluzione per l'eradicazione mondiale della poliomielite che ha segnato il lancio della **Global Polio Eradication Initiative** (Gpei), guidata dai governi nazionali, l'Oms, il Rotary International, i Centri statunitensi per il Controllo delle malattie e la prevenzione (Ccd), l'Unicef, e supportata da altri partner tra cui la Bill e Melinda Gates Foundation.

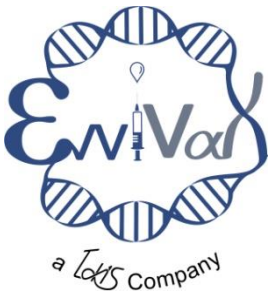
Wild Poliovirus 1988

Polio Eradication

a Loxo Company

Programma di eradicazione

- Vaccinazione sistematica di tutti i nuovi suscettibili
- Monitoraggio dell'accumulo di suscettibili
- Campagne straordinarie di immunizzazione (catch-up)
- Ricerca di «sacche» di suscettibili da immunizzare (mop-up)



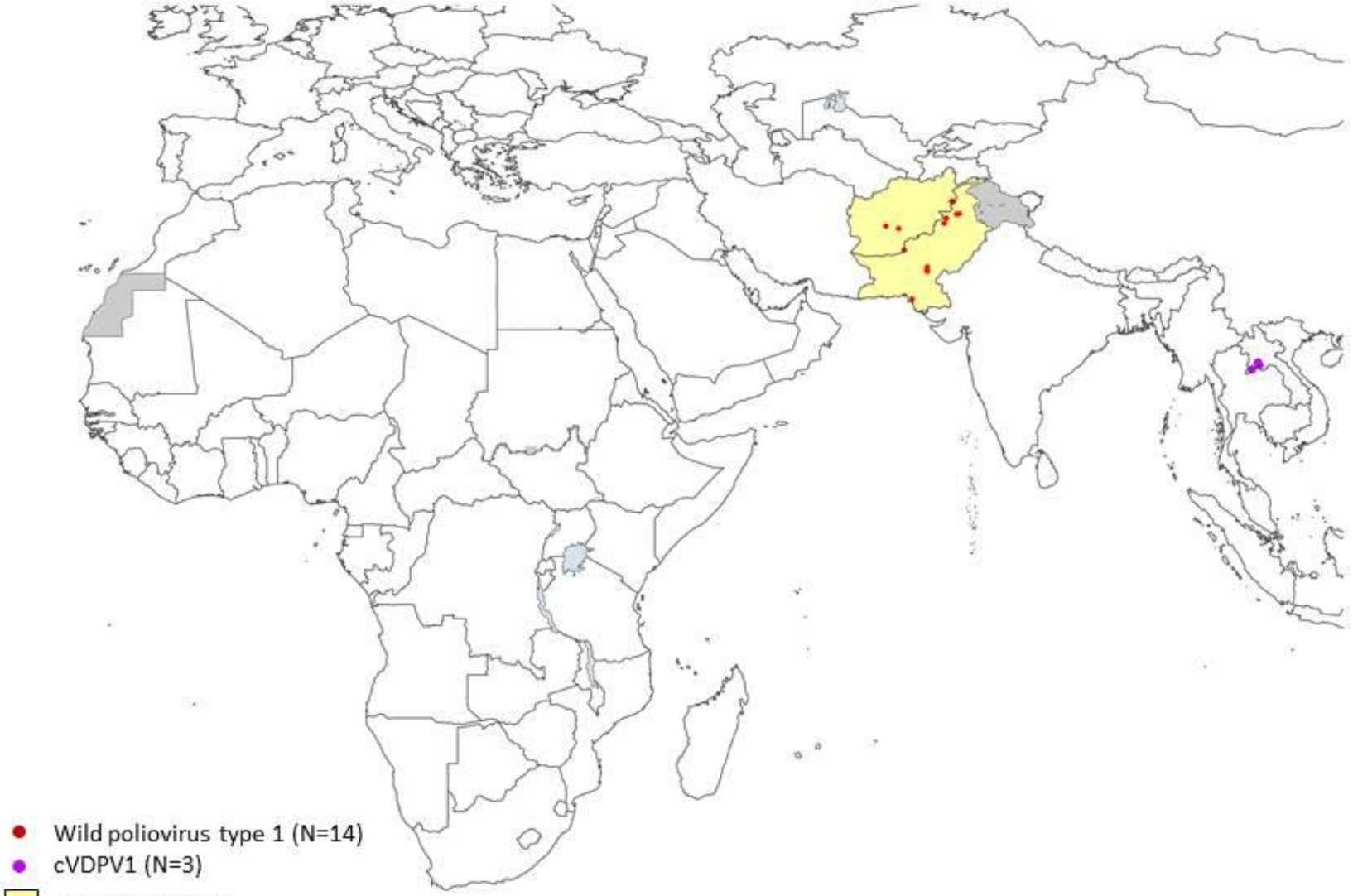
I progressi

Sono diventate *polio-free*:

- **1994**: Americhe
- **2000**: Regione Pacifico occidentale ed Europa
- **2014**: Sud-Est Asiatico
- **Agosto 2020**: Africa

- Dal lancio della Gpei il numero di casi è sceso di oltre il **99%.** Oggi la poliomielite è ancora endemica in due soli Paesi: il Pakistan e l'Afghanistan

Wild Poliovirus & cVDPV Cases[1], 2016
01 January – 10 May

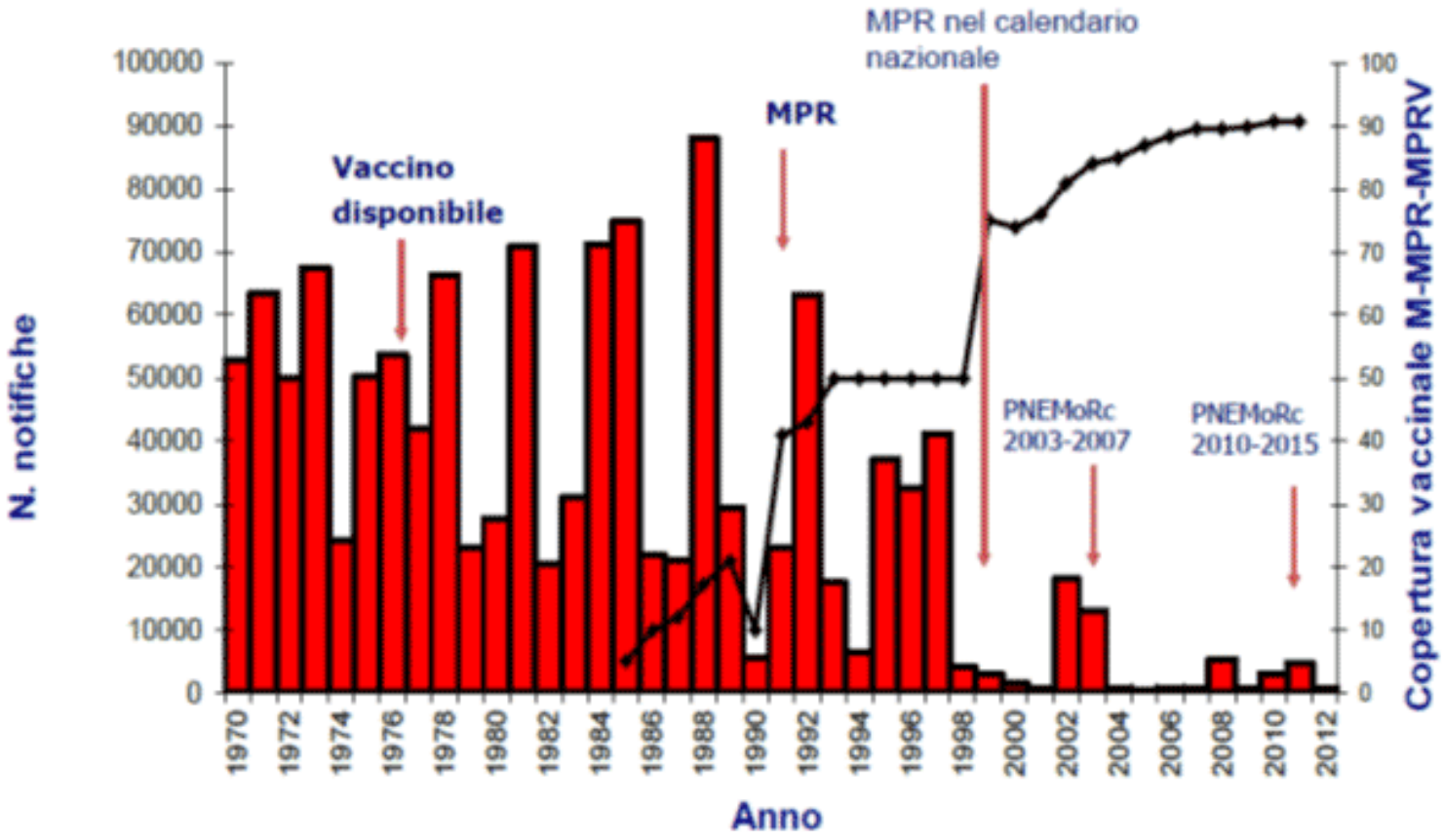


[1]Excludes viruses detected from environmental surveillance.

Data in WHO HQ as of 10 May 2016

Vaccino e Morbillo

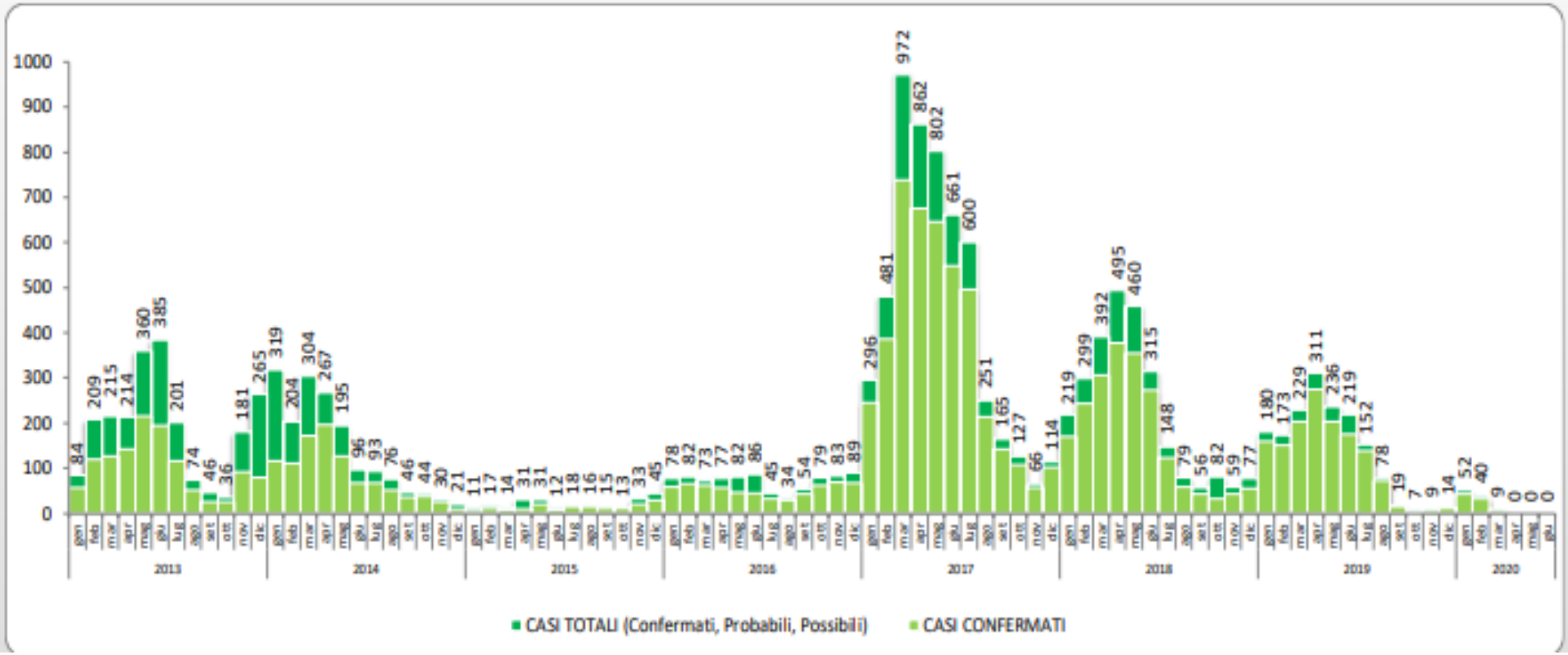
Notifiche annuali di morbillo e copertura vaccinale entro 2 anni di età, Italia 1970-2012



Fonte dati: notifiche obbligatorie (Min. Salute) e sistema di sorveglianza speciale morbillo (CNESPS-ISS)

EnVaL a Tokos Company

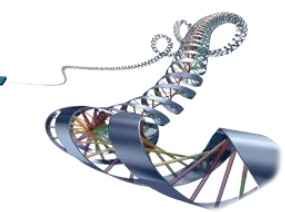
Vaccino e Morbillo: il paradosso del 2017



Copertura Vaccinale: 80%

a Tolus Company

Non c’è dubbio:
I Vaccini hanno cambiato la Storia dell’Uomo



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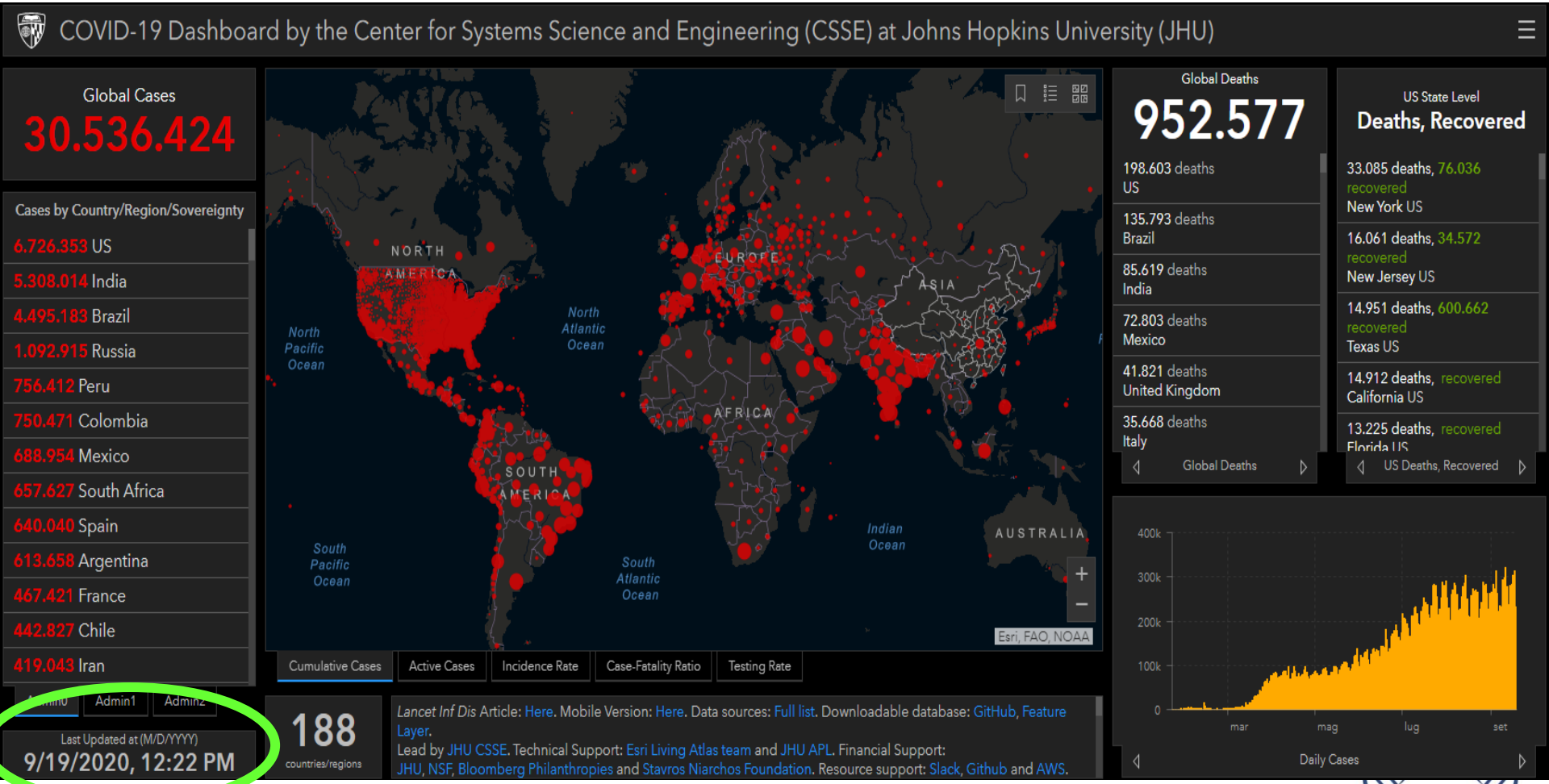
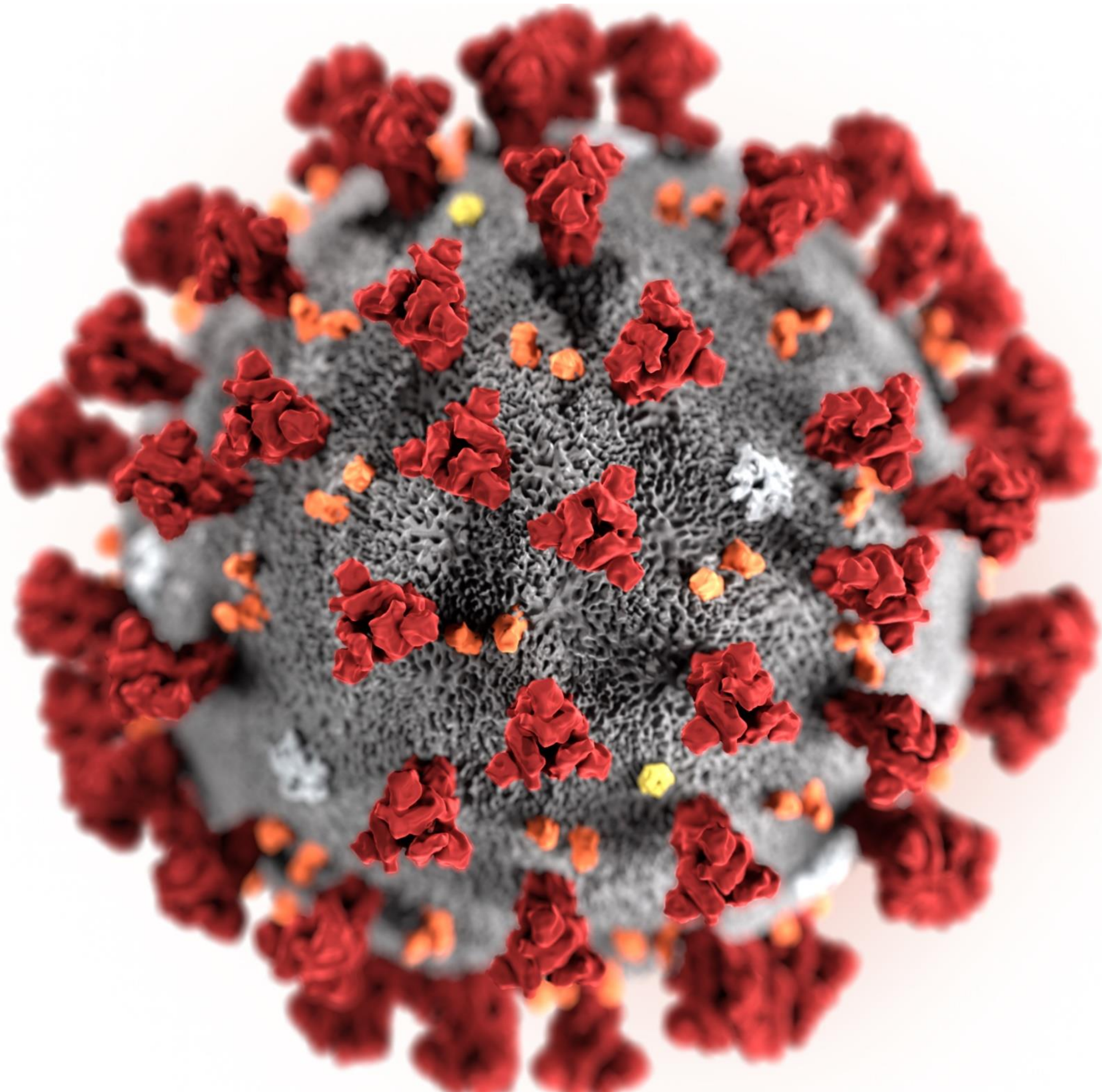
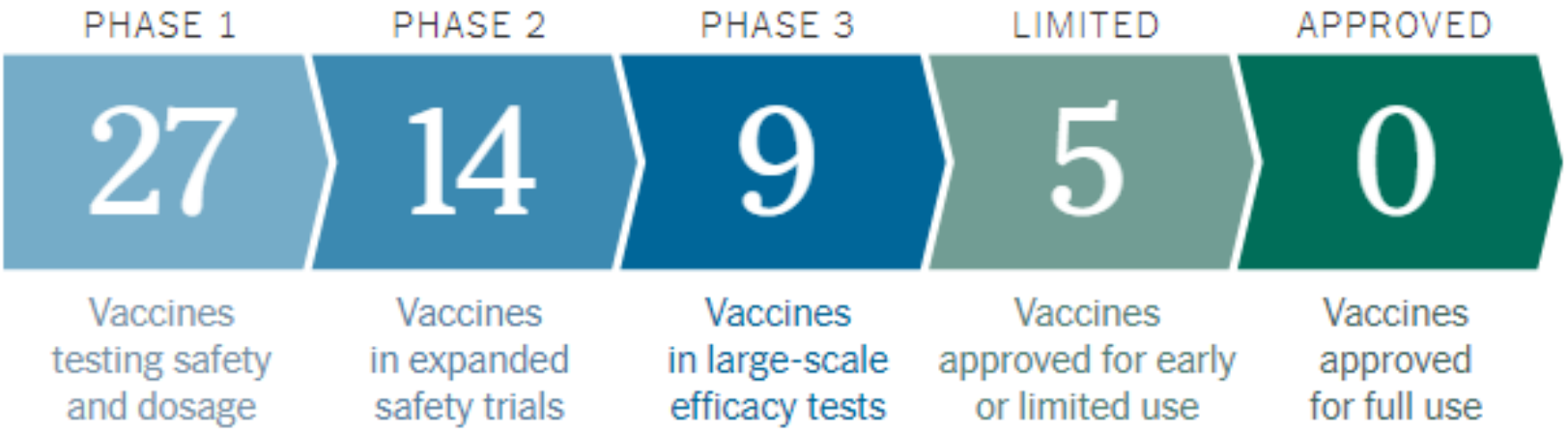
COVID-19: oggi

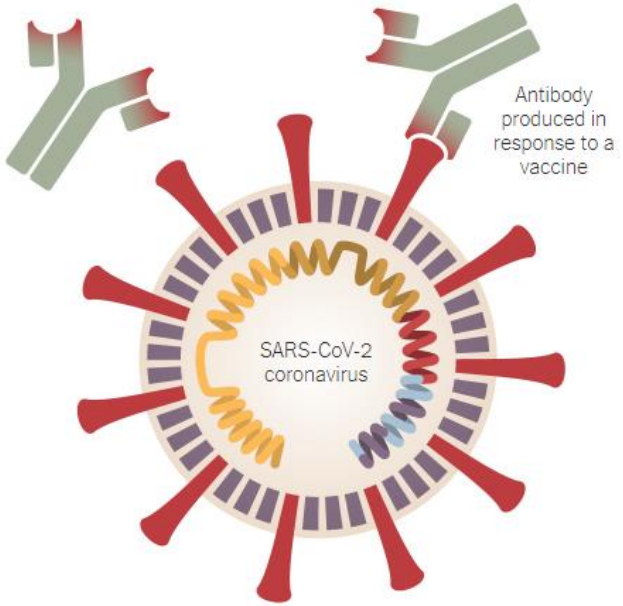




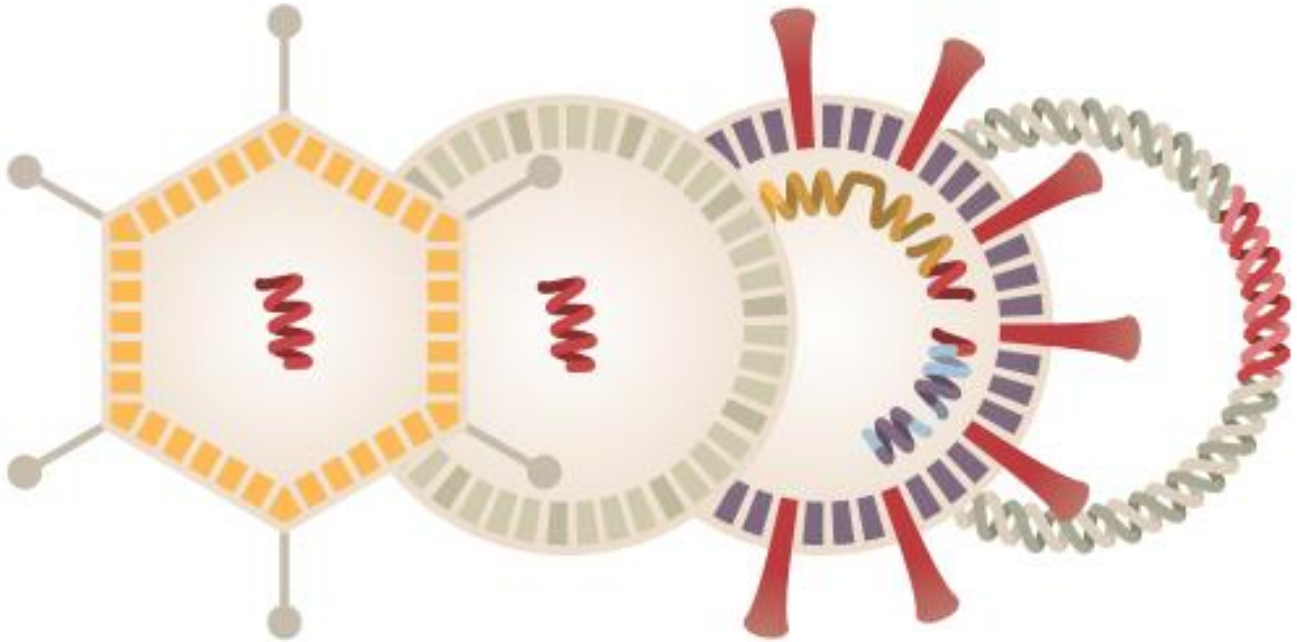
I Vaccini contro COVID-19



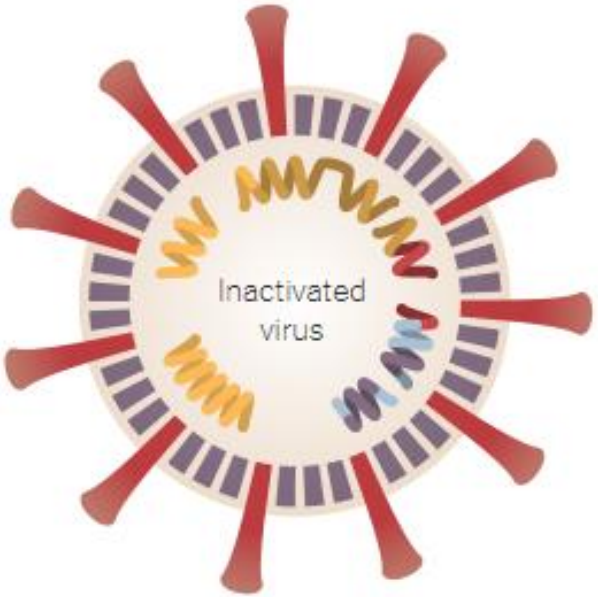
Una corsa contro il tempo



Tante Tecnologie in campo….



Il virus Inattivato



I Vaccini Inattivati

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sinovac

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武汉生物制品研究所有限责任公司
WUHAN INSTITUTE OF BIOLOGICAL PRODUCTS CO.,LTD.

PHASE 2

INSTITUTE OF MEDICAL BIOLOGY
CHINESE ACADEMY OF MEDICAL SCIENCES

PHASE 1 PHASE 2 COMBINED PHASES

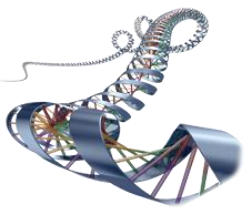
BHARAT BIOTECH

icmr
INDIAN COUNCIL OF MEDICAL RESEARCH

NATIONAL INSTITUTE OF VIROLOGY PUNE

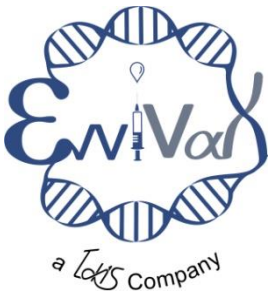
PHASE 1

RIBSP
Research Institute for Biological Safety Problems



EnVaX
a Toh's Company

I Vaccini basati su proteine



Vaccini Proteici

PHASE 1

SANOFI gsk

PHASE 1 PHASE 2 COMBINED PHASES

IFV INSTITUTO FINLAY DE VACUNAS

PHASE 2

ZFSW The Biologics Company

INSTITUTE OF MEDICAL BIOLOGY
CHINESE ACADEMY OF MEDICAL SCIENCES

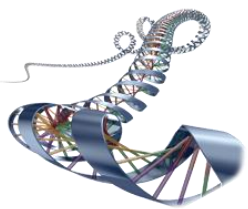
PHASE 1 PHASE 2 COMBINED PHASES

NOVAVAX
Creating Tomorrow's Vaccines Today

PHASE 1 PHASE 2 COMBINED PHASES

BEKTOP

Toh's



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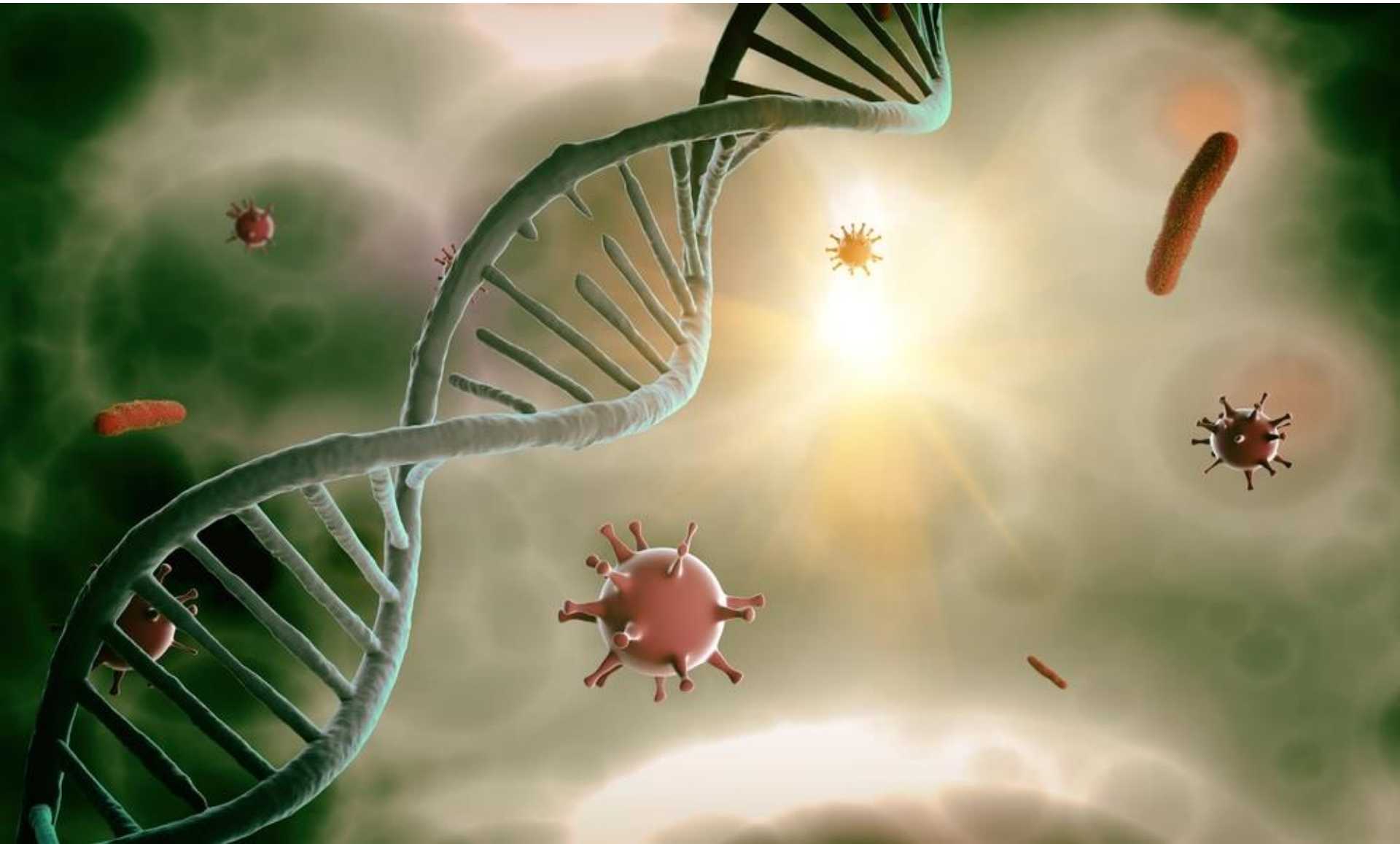
Una nuova categoria:
i Vaccini Genetici



Cosa avviene nelle cellule: dai Geni alle Proteine

DNA → mRNA → Protein

STORAGE

DNA stores instructions for proteins in the nucleus

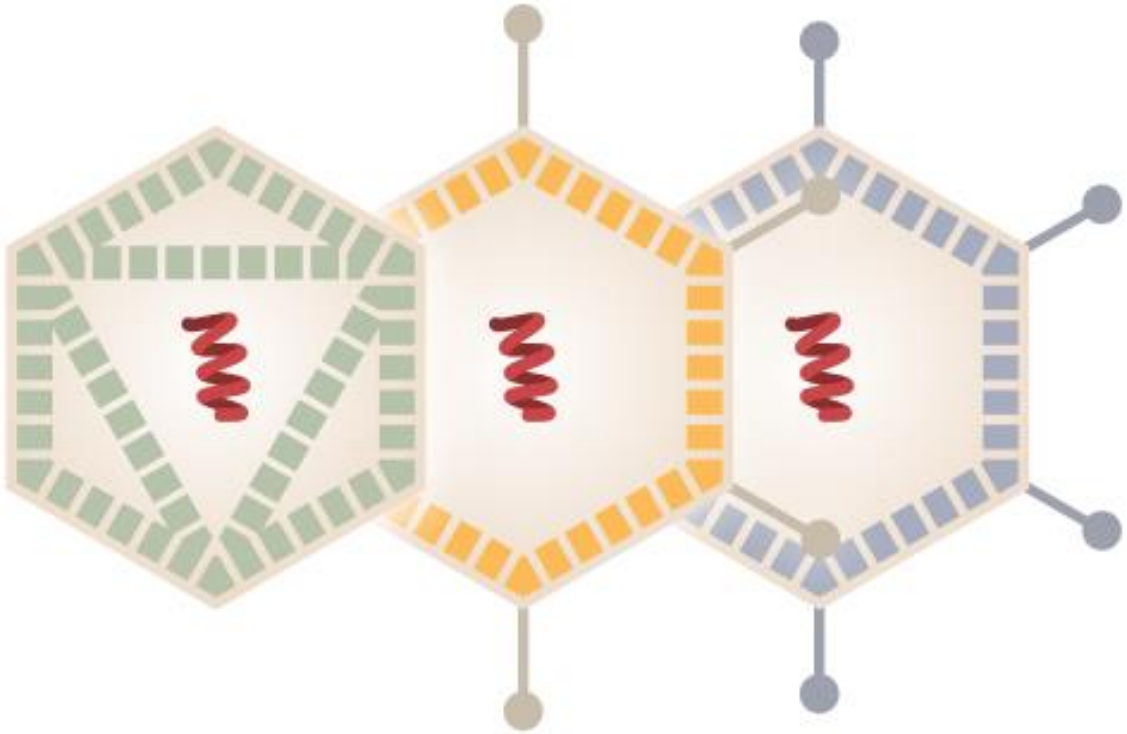
SOFTWARE

mRNA is a temporary set of instructions for cells to make a protein; mRNA is made using DNA

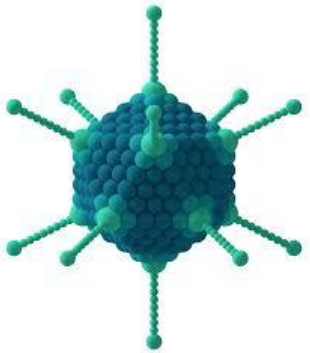
APPLICATIONS

Proteins form the basis of life by performing the functions required by every cell; proteins are made using mRNA

I Vettori Virali



Vaccini basati su Adenovirus



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CanSinoBIO

PHASE 1

PHASE 3 APPROVED FOR EARLY USE

REITHERA

SISTEMA SANITARIO REGIONALE
IRCCS
LAZZARO SPALLANZANI

МИНИСТЕРСТВО
ЗДРАВООХРАНЕНИЯ
РОССИЙСКОЙ ФЕДЕРАЦИИ

PHASE 1 PHASE 2 COMBINED PHASES

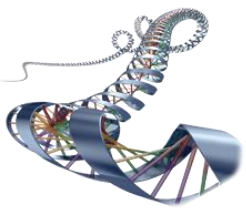
PHASE 2 PHASE 3 COMBINED PHASES

Johnson&Johnson

Beth Israel Lahey Health
Beth Israel Deaconess Medical Center

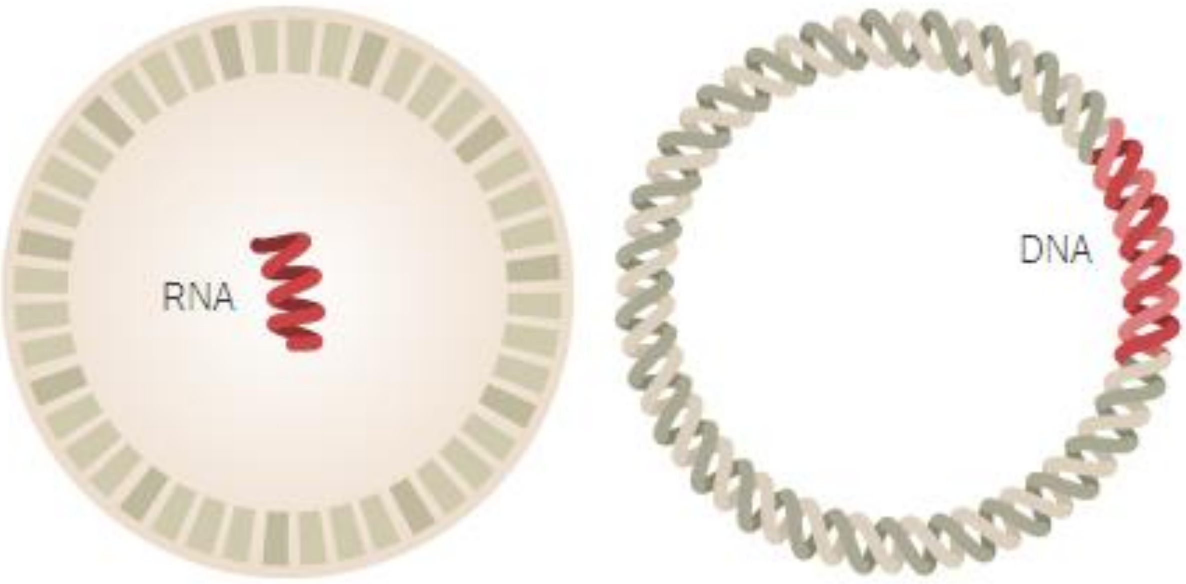
AstraZeneca

UNIVERSITY OF
OXFORD



EnVaL
a Toks Company

I Vaccini ad acidi nucleici



Vaccini basati su RNA

PHASE 3

moderna

NIH National Institutes of Health
Turning Discovery Into Health

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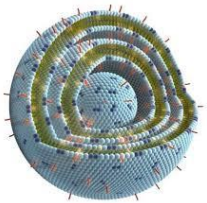
BIONTECH Pfizer FOSUN PHARMA



PHASE 2

CUREVAC

PHASE 1 PHASE 2 COMBINED PHASES

Imperial College London

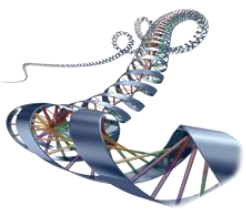
MORNINGSIDE

PHASE 1 PHASE 2 COMBINED PHASES

ARCTURUS therapeutics

DukeNUS Medical School

Tokis



EnVaxy
a Tokis Company

Vaccini basati su DNA

PHASE 1

INOVIO
POWERING DNA MEDICINES

PHASE 1 PHASE 2 COMBINED PHASES

AnGes 大阪大学 OSAKA UNIVERSITY 寶 TaKaRa

PHASE 2

Zydus
dedicated to life

PHASE 1

Genexine

PRECLINICAL

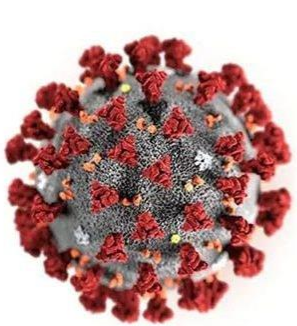
Toh's

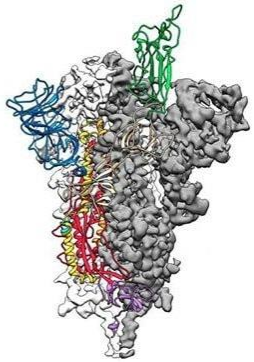
ROTTAPHARM BIOTECH

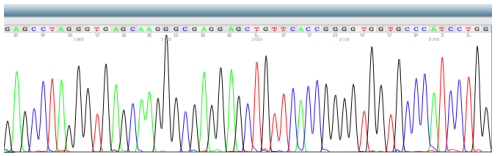
Toh's

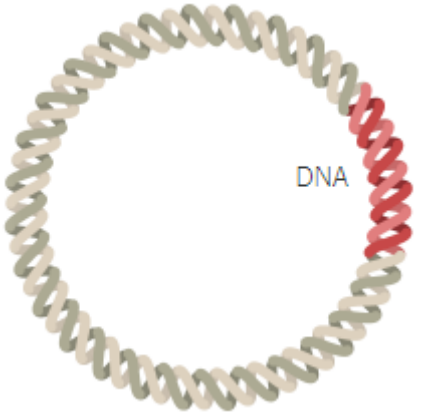
EnVaxy
a Toh's Company

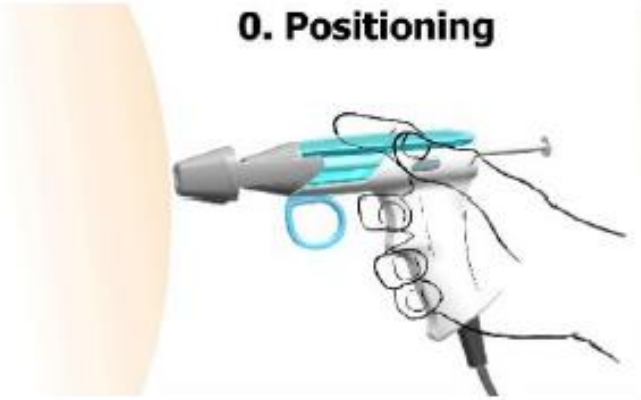
La Nostra Tecnologia

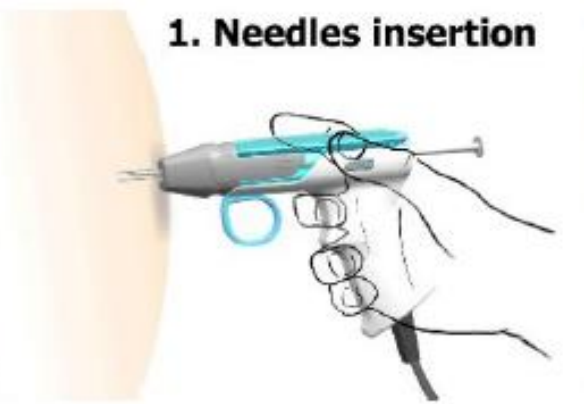


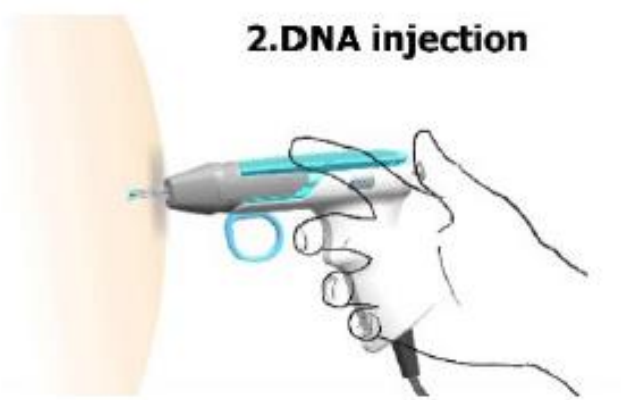


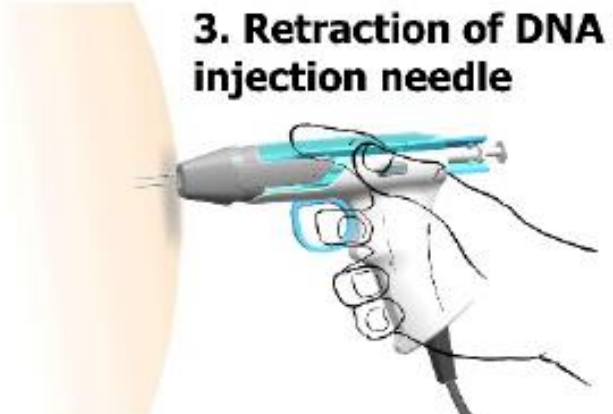


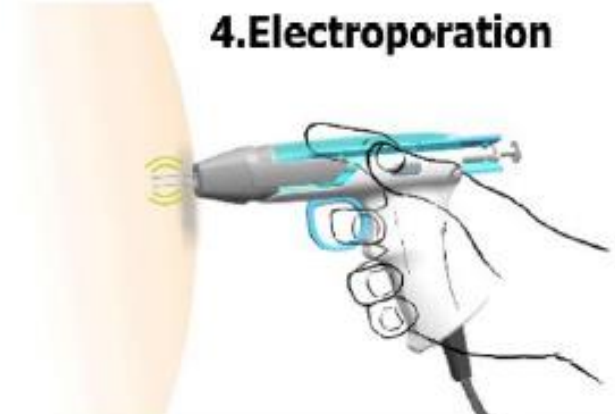






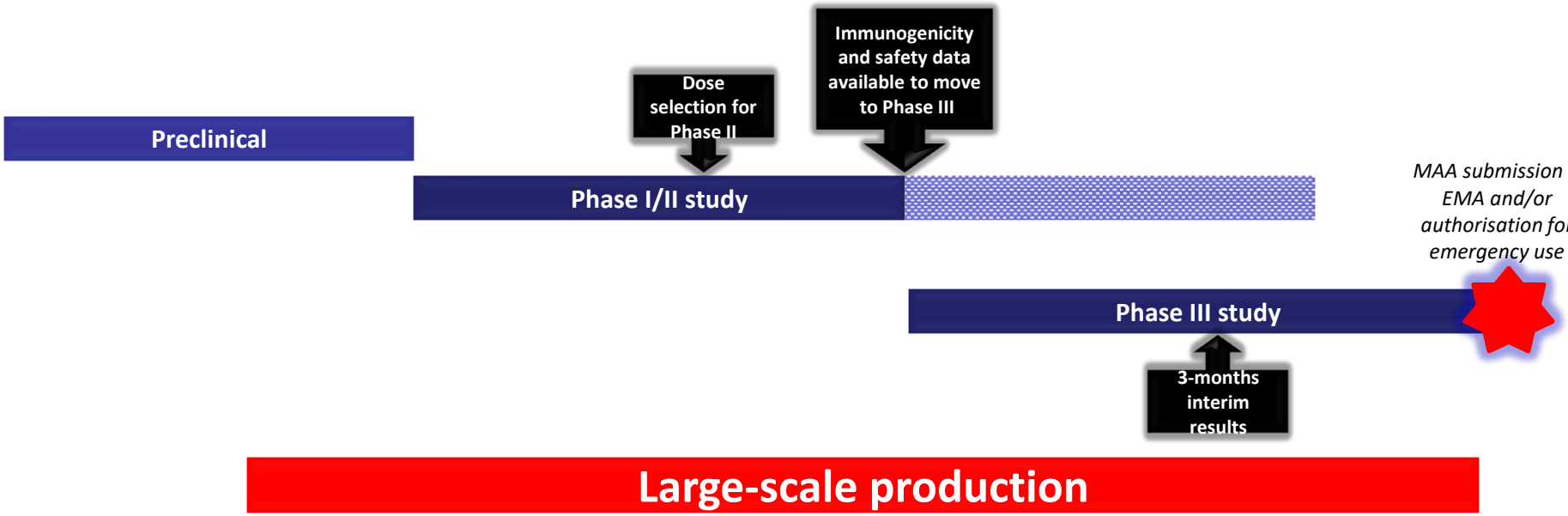


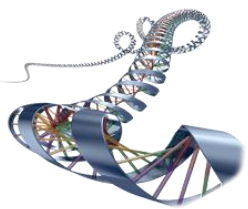




Fasi di Sviluppo di COVID-*e*Vax

2020						2021											
Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec





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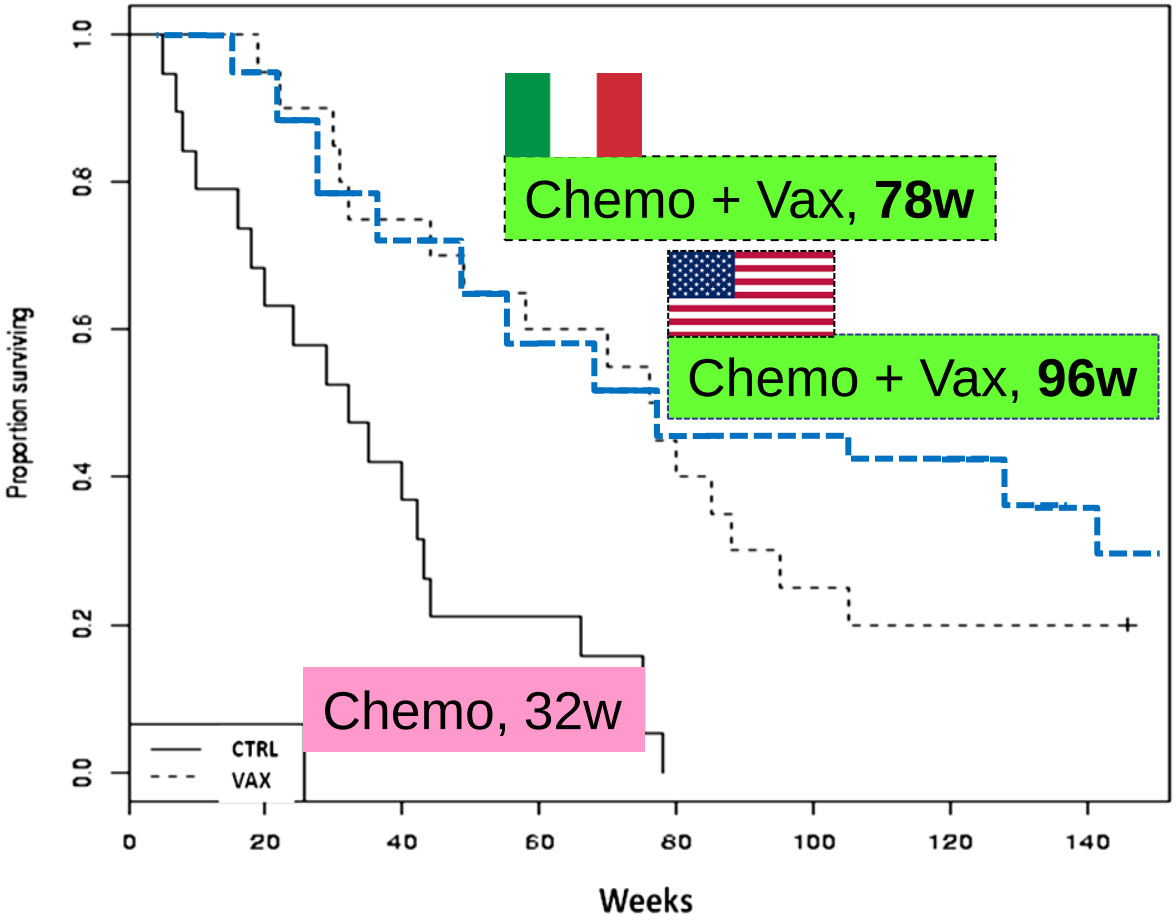
One in every four dogs will develop cancer during their lifetime

Tel-*e*Vax:
Proof of Concept Achieved!

Overall survival



- **>2x Enhanced Dog Survival**
- **Less Chemotherapy Needed**

Other Trials in Progress

- **Solid K9 Cancer**
- **Feline Cancer**

Gavazza et al., Human Gene Ther 2013

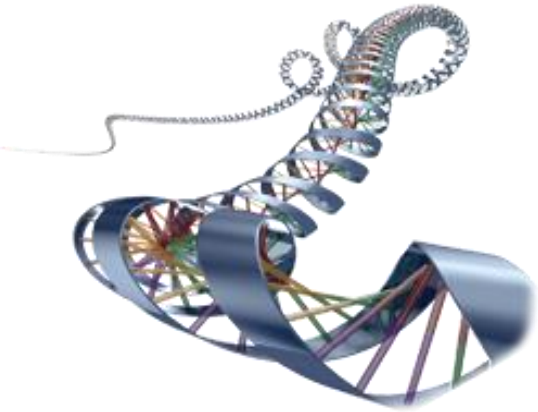
Oltre COVID-19

- La Ricerca Italiana nonostante i bassi investimenti, ha grandi Scienziati e grandi tecnologie
- I Vaccini hanno cambiato la Storia dell'Umanità
- Per COVID-19, solo un vaccino potrà consentire il contenimento della malattia
- Da questa esperienza, tutti stiamo imparando tantissimo e cambiando il paradigma di Sviluppo dei Farmaci

Takis

EviVax

a Takis Company



a Takis Company

Luigi Aurisicchio

Founder, Chief Executive and Scientific Officer

Web: www.takisbiotech.it